Introduction to Computer Organization and Architecture

Topic 0. Course overview

Han, Nguyen Dinh (han.nguyendinh@hust.edu.vn)

Faculty of Mathematics and Informatics
Hanoi University of Science and Technology

Outline

1

Your first project

Your first project

Students work individually to carry out the following tasks:

1. Explore and provide the details of your own computer or laptop using the given template
2. Implement the MARS software (MIPS Assembler and Runtime Simulator) that can be downloaded at http://courses.missouristate.edu/KenVollmar/MARS/
3. Write a Hello World program on MARS
4. Run your program, and capture the result screen and save it as a JPG file
5. Submit your Word and JPG files (i.e. results of tasks 1 and 4). The submission link will be sent to you on completion

2

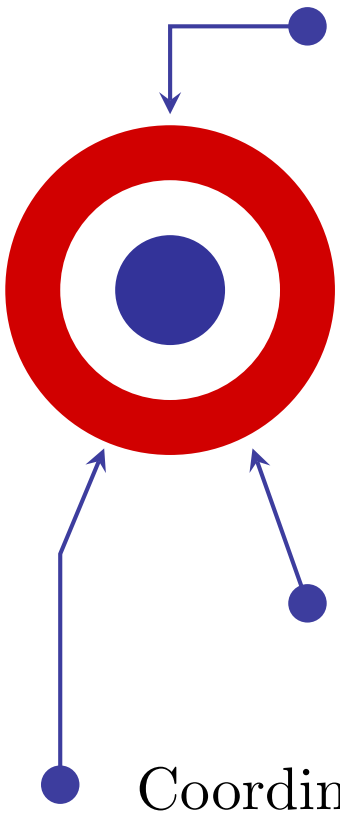
Introduction to the course CS365

2.1. Course purpose

- This is a required major course in Troy Computer Science Program at HUST. The course covers basic knowledge of computer architecture and organization. Its main focus will be on underlying principles, technological standards of computer design and manufacturing. The practice part of the course allows students to work with various organizational paradigms that determine the capabilities, performance, and the success of modern computer systems
- The course equips students with central ideas in computer organization and operation: computing technology; hardware-software interaction; technologies for advancing the performance of computers and computer programs; system programming and device control, etc.

2.2. Course objectives

After completing this course, you will be able to:



- Master fundamental concepts that underlie computer architecture and organization
- Presents the structure and operating principles of computer elements
- Design/simulate computer operations, hardware components, and communication between components
- Install system software, device drivers, etc. compatible with the computer's architecture
- Coordinate a computer modeling and simulating project and work with other team members to build deliverables along the way

2.3. Course content

This course covers key selected topics in computer architecture and organization including:

- General introduction
- Computer organization: the arrangement of computer components and their relationship
- The instruction set architecture
- The CPU structure (ALU, register, decoder), pipelining technique
- Memory and I/O systems

2.4. Learning materials

1. David A. Patterson and John L. Hennessy (2014) *Computer Organization and Design*. Fifth Edition. Elsevier, Inc
2. John L. Hennessy and David A. Patterson (2019) *Computer Architecture: A Quantitative Approach*. Sixth Edition. Elsevier, Inc
3. William Stallings (2016) *Computer Organization and Architecture: Designing for Performance*. Tenth Edition. Pearson Education, Inc
4. Eben Upton, et al (2016) *Learning Computer Architecture with Raspberry Pi ®*. John Wiley & Sons, Inc
5. Charles W. K. (2015) *Introduction To MIPS Assembly Language Programming*. eBook at http://cupola.getysburg.edu

3. Projects and assignments

Individual project and assignments

1. Quiz
2. Homework
3. Oral presentation

Group project

You are required to work in a group of three to five students. Your group will make use of tools (e.g. VHDL or Verilog) to model and simulate computer hardware. You are allowed to select other research topics like investigation into methods to improve or enhance the performance of computer systems; advanced architectures for modern computers (e.g. Quantum, DNA, CNTs computers)

Course overview

Thank you very much for your attention!